407 615

63-4-1

SEVENTH QUARTERLY REPORT

STEP 1

PRODUCTION ENGINEERING MEASURE

ON

TRANSISTOR, POWER,

400 MC, 300 MW

CONTRACT NO. DA-36-039- SC-85975

PLACED BY

U. S. ARMY ELECTRONICS MATERIAL AGENCY

PHILADELPHIA, PA.

MOTOROLA Semiconductor Products Inc

8008 EAST McDOWELL ROAD · PHOENIX 8, ARIZONA A SUBSIDIARY OF MOTOROLA INC.

Seventh Quarterly Report

Step 1

Production Engineering Measure

400 Mc, 300 mW Power Transistor

Order No. 6030-PP-61

Contract No. DA-36-039-SC85975

This Report Covers the Contract Period:

December 23, 1962 to March 23, 1963

Report Written By: R. A. Jacobs

John C. Howe

Approved By: J. C. Haenichen

Submitted By

MOTOROLA INC.
Semiconductor Products Division
5005 East McDowell Road
Phoenix, Arizona

Table of Contents

List of Figures

1. Purpose of the Contract

The contract is for performance of production engineering, fabrication, and testing of a 400 Mc 300 mW power transistor. The contractor, Motorola Inc., is to supply three hundred and seventy-five (375) engineering samples to the U. S. Army Electronics Research and Development Agency, followed by one hundred (100) pre-production samples to the U. S. Army Electronics Materiel Support Agency.

Upon acceptance of the pre-production samples, with approval by the U. S. Army Electronics Materiel Agency based on an approved test specification, Motorola is to submit two thousand (2,000) pilot production devices.

The pilot line established by Motorola will have a production capability of two hundred (200) good units per eight-hour shift. This capacity shall be demonstrated under operating conditions during the period of manufacture of the pilot production samples.

The device specification may be modified from time to time through agreement by the U. S. Army Electronics Materiel Agency and Motorola, to reflect improvements as progress is made in development of production methods.

Motorola will submit Quarterly Reports for the duration of the contract with report dates based on the date of award (June 23, 1961) and will complete the contract with the submission of a final engineering report, a com-

plete set of bills of parts and materials, and a General Report for Step II (Production Engineering Measure).

This device has been registered with EIA as the 2N2568, and will be identified as such in this and future reports.

2. Summary of the Report

There have been no changes in the device mechanical design, device electrical design, or process technology since the last report. During this quarter the second group of pre-production samples successfully passed the Group B, Subgroups 2 and 5 Environmental Tests. Also during this quarter a group of devices with an all aluminum lead bonding system were subject, along with a control group of devices with a gold-aluminum system, to the vibration variable frequency, constant acceleration, and shock tests. There were no failures on any of the tests.

3. General Background of the Contract

Performance of the contract constitutes a Production Engineering measure (PEM) in accordance with Step 1 of Signal Corps Industrial Preparedness Requirements No. 15 (1 October 1958) per Signal Corps Technicial Requirement SCS96-A (15 May 1961).

The contract was awarded to Motorola on 23 June 1961 by the U. S. Army Electronics Materiel Agency. Due to the non-approval of the pre-production samples and partial

re-test required thereof, an extension of time will be necessary to complete the contract. A revised contract schedule is shown in Figure 4.

4. Device Design

4.1 Mechanical Design

Design of the 2N2568 package is unchanged from what has been previously reported. Figures 1, 5, and 6 illustrate the final package design.

4.2 Electrical Design

Electrical design of the 2N2568 is unchanged since the last report.

5. Process Technology

Process Technology is unchanged since the last report.

6. Electrical Characteristics and Test Data

During the seventh quarter the second group of pre-production samples successfully completed the Group B, Subgroups 2 and 5 environmental tests. Table 1 is a summary of the results of the pre-production re-test. Unit #6 failed after the Group B Subgroup 2 tests. The data indicates an open base. It is significant to note that there were no failures due to faulty packages as were encountered during the first pre-production environmental tests. Unit #85 failed after the salt atmosphere test. Post test electrical data is within specification on this unit, but it is considered a failure due

to the loss of the ground (case) lead. Again, there were no failures during the re-test of the same type as experienced during the first pre-production environmental test. Figures 9 through 11 are a compilation of the post test data.

Also during the seventh quarter, the first group of devices with an all aluminum lead bonding system were subjected to some of those environmental tests which measure the mechanical stability of the lead bonding system. With each group of all aluminum system devices was tested a control group of devices having the standard gold-aluminum system. Figures 12, 13, and 14 show, respectively, the data for vibration variable frequency, constant acceleration and shock tests. The conditions for these tests were as specified on the 2N2568 specification. Because the failures from these tests would be expected to be of a catastrophic nature rather than a degradation of parameters, some devices used had h_{FE} less than the minimum specified for a 2N2568. There were no failures on any tests. Presently in process but not yet completed are ultra-sonic cleaning and vibration fatigue tests.

6.1 General Conclusions

The re-test has shown that the problems which caused failures during the first pre-production environmental tests have been solved. The failures which did occur are well within the AQL required by the device specifica-

tion. The initial tests conducted on devices with an all aluminum lead bonding system indicate that this system will be able to meet all those tests required of the standard gold-aluminum system.

7. Plans for the Eighth Quarter

The pilot production run is scheduled for completion during the eighth quarter. Additional work will continue on the all aluminum lead bonding system.

Summary of Re-tests
Table 1

	Unit No.	No. of Units	No. of Failures	Failure No.(Unit)
Group A	1-100	100	0	
Group B				
Subgroup 2				
Soldering	1-50	50	1	#6
Temperature Cycling	1-50	50		
Thermal Shock	1-50	50		
Moisture Resistance	1-50	50		
Subgroup 5				
Reduce Barometric Pressure	51-100	50	0	
High Temperature Operation	51-100	50	0	
Low Temperature Operation	51-100	50	0	
Salt Atmosphere	51-100	50	1	#85
Subgroup 7				
Thermal Resistance	1-10, 51-60	20	0	

MILITARY SPECIFICATION

TRANSISTOR, GERMANIUM, POWER, 400 MC
TYPE SigC-2N2568

1. SCOPE

1.1 Scope.- This specification covers the detail requirements for germanium, UHF, power transistors capable of delivering 300 mW of output power at 400 Mc. The transistors have the following characteristics at T_C = 25° ± 3°C. (See 3.2):

	C_{ob}	h_{ib}	h_{fe}	P_G	P_o	h_{FE}
	uuf	ohms	db	db	mW	---
Minimum	---	---	6	10	300	15
Maximum	3.0	15 + j50	---	---	---	---

1.2 Performance.-See 3.4 herein.

1.3 Maximum ratings.

BV_{CEO}	BV_{CES}	BV_{EBO}	I_C	P_c	T_j	T_{stg}
Vdc	Vdc	Vdc	mAdc	W	°C	°C
20	35	1	100	1	100	-65 to +100

2. APPLICABLE DOCUMENTS

2.1 The following specifications and standards of the issue in effect on date of invitation for bids, form a part of this specification, to the extent specified herein:

SPECIFICATIONS

MILITARY

MIL-S-19500	Semiconductor Devices, General Specification for

STANDARDS

MILITARY

MIL-STD-202	Test Methods for Electronic and Electrical Component Parts

DRAWINGS

SIGNAL CORPS

SC-A-46600	Preproduction Sample Approval In Lieu of Qualification Requirements in Specifications

(Copies of specifications, standards, and drawings required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer. Both the title and number or symbol should be stipulated when requesting copies.)

3. REQUIREMENTS

3.1 Requirements.- Requirements for the transistors shall be in accordance with Specification MIL-S-19500, and as specified herein:

3.2 Abbreviations and symbols.- The abbreviations and symbols used herein are as defined in Specification MIL-S-19500, and as follows:

I_c.....collector current

P_c.....collector power

P_i.....input power

P_o.....power output

3.3 Design and construction.- The design and construction of the transistors shall be in accordance with applicable requirements in Specification MIL-S-19500. Physical dimensions are specified in figure 1.

3.3.1 Transistor case.- The transistor case shall incorporate a suitable means for readily mounting the device and dissipating the required power. The case shall be electrically insulated from the collector, emitter, and base.

3.3.2 Operating position.- The transistors shall be capable of proper operation in any position.

3.4 Performance characteristics.- The transistor performance characteristics shall be as specified in Tables I and II herein.

3.5 Type-designation marking.- The transistors shall be marked with the letters "SigC" and the "2N" designation of the device. The "2N" designation of the device shall be "(X-3)" until an identification number conforming to type designation requirements of Specification MIL-S-19500 has been established.

4. QUALITY ASSURANCE PROVISIONS

4.1 General.- Except as otherwise specified herein, the responsibility for inspection, general procedures for acceptance, classification of inspection and inspection conditions and methods of test shall be in accordance with MIL-S-19500, Quality Assurance Provisions.

4.2 Preproduction Sample Approval.- The Preproduction Sample Approval requirements in Signal Corps Drawing SC-A-46600 replace any Qualification requirements referable to the product covered herein.

4.3 Acceptance inspection.- Acceptance inspection shall be in accordance with requirements in Specification MIL-S-19500, Quality Assurance Provisions, and as otherwise specified herein. Groups A and B inspection shall consist of the examinations and tests specified in Tables I and II, respectively, herein. Acceptance inspection shall include inspection of preparation for delivery (see Section 5 herein).

4.3.1 Acceptable Quality Levels and Inspection Levels.- The Acceptable Quality Level (AQL) and Inspection Level specified for a subgroup in Tables I and II herein shall apply for all of the tests, combined, in the subgroup.

4.4 Destructive tests.- The Group B, Subgroups 2, 3, 4, 5 and 6 tests are considered destructive. However, the tests of Subgroups 2 and 3 can be considered non-destructive if sufficient evidence is presented to the inspection authority to that effect. Acceptable evidence, for example, could be the repetition, ten times, of the Subgroups 2 and 3 tests on the same sample units without any significant electrical device degradation. This test repetition procedure need be done only once at inception of acceptance inspection, provided no change in design or of production techniques has been effected.

4.5 Disposition of sample units.- Sample units that have been subjected to Group B, Subgroups 4, 5 and 6 inspection shall not be delivered on the contract or order. Sample units that have been subjected to and have passed Group B, Subgroups 1, 2, 3, 7, 8 and 9 tests not determined to be destructive tests may be delivered on the contract or order provided that, after Group B inspection is terminated, those sample units are subjected to and pass Group A inspection. Defective units from any sample group that may have passed sampling inspection shall not be delivered on the contract or order until the defect(s) has(have) been remedied to the satisfaction of the Government.

4.6 Particular examinations and test procedures

4.6.1 Oscillator power output test.- The specified voltage and current shall be applied to the respective terminals, and the power output of the oscillator shall be measured at the frequency specified.

4.6.2 Small-signal short-circuit input impedance test.- The test shall be made as specified in paragraph 50.37 of MIL-S-19500; however, the magnitude shall be separated into real and imaginary parts.

Table 1. Group A Inspection

MIL-S-19500 Appx. C. Ref. Par.	Examination or Test (see 4.3)	Conditions (see 4.1)	AQL (percent defective)	Insp. Level or Code	Symbol	Limits Min.	Limits Max.	Unit
	Subgroup 1							
30.13	Visual & mechanical examination		1.0:Major 2.5:Minor	II	---	---	---	---
	Subgroup 2							
50.9	Collector cutoff current	V_{CE}=15Vdc V_{EB}=0	1.0	II	I_{CES}	---	2.0	uAdc
50.9	Collector cutoff current	V_{CE}=35Vdc V_{EB}=0			I_{CES}	---	100	uAdc
50.6	Emitter cutoff current	V_{EB}=1Vdc I_C=0			I_{EBO}	---	100	uAdc
50.40	Static forward current transfer ratio	V_{CE}=5Vdc I_C=40mAdc			h_{FE}	15	60	---
50.25	Saturation voltage	I_C=100mAdc I_B=8.0 mAdc			$V_{CE(sat)}$	---	0.75	Vdc
50.1	Collector Breakdown voltage	I_C = 40mAdc I_B = 0 Pulse Test Repetition Rate=1Kc Pulse Length≤2μsec			BV_{CEO}	20	---	Vdc

Table 1. Group A Inspection (cont'd)

MIL-S-19500 Appx. C Ref. Par.	Examination or Test (see 4.3)	Conditions (see 4.1)	AQL (percent defective)	Insp. Level or Code	Symbol	Limits Min.	Limits Max.	Unit
	Subgroup 3							
50.15 1/	Power Gain	V_{CB}=15Vdc I_C=40mAdc f=400mc P_i=30mW Fig. 2			P_G	10	---	db
2/	Oscillator power output	V_{CB}=15Vdc I_C=40mAdc f=400mc Fig. 3			P_o	300	---	mW
50.19	Collector capacitance	V_{CB}=15Vdc I_E=0 Case Grounded	1.0	II	C_{ob}	---	3.0	uuf
50.33	Small signal short circuit forward current transfer ratio	V_{CE}=10Vdc I_C=40mAdc f=400mc			h_{fe}	6	---	db

1/ Test circuit shall be in accordance with Figure 2.

2/ See 4.6.1 herein. Test circuit shall be in accordance with Figure 3.

Table 1. Group A Inspection (cont'd)

MIL-S-19500 Appx. C Ref. Par.	Examination or Test (see 4.3)	Conditions (see 4.1)	AQL (percent defective)	Insp. Level or Code	Symbol	Limits Min.	Limits Max.	Unit
	Subgroup 3 (cont'd)							
3/	Small-signal short-circuit input impedance	V_{CB}=10Vdc I_C=40mAdc f = 400 mc			h_{ib}	---	15 + j50	ohms

3/ See 4.6.2 herein.

TABLE II. Group B Inspection

MIL-S-19500 Appx. C Ref. Par.	Examination or Test (see 4.3)	Conditions (see 4.1)	AQL (percent defective)	Inspection Level or Code	Symbol	Limits Min.	Limits Max.	Unit
	Subgroup 1							
30.9	Physical dimensions		2.5	L6	---	---	---	---
	Subgroup 2							
40.13	Soldering		4.0	L6 Reduced:L4 Procedure:R-1	---	---	---	---
40.14	Temperature cycling	-65° to +100°C 5 cycles; 1/			---	---	---	---
40.16	Thermal shock (glass strain)	T(high)=85°±3°C T(low) = 0°±2°C			---	---	---	---
40.6	Moisture resistance				---	---	---	---
	Subgroup 3							
40.10	Shock	No Voltages 5 blows in each direction X_1, Y_1, Y_2 and Z_1; (total of 20 blows) 1500G	4.0	L6 Reduced:L4 Procedure:R-1	---	---	---	---
40.4	Constant acceleration (Centrifuge)	20,000G			---	---	---	---
40.18	Vibration fatigue	No Voltages			---	---	---	---
40.20	Vibration, variable frequency	V_{CB} = 20 Vdc I_E = 0			---	---	---	---

TABLE II. Group B Inspection (cont'd)

MIL-S-19500 Appx. C Ref. Par.	Examination or Test (see 4.3)	Conditions (see 4.1)	AQL (percent defective)	Inspection Level or Code	Symbol	Limits Min.	Limits Max.	Unit
	Subgroup 4							
40.5	Lead fatigue	2/; no lead restriction	4.0	L6 Reduced:L4 Procedure:R-1	---	---	---	---
	Subgroup 5							
40.1	Barometric pressure reduced (altitude operation)	V_{CB}=35 Vdc I_E = 0	4.0	L6 Reduced:L4 Procedure:R-1	---	---	---	---
30.6	High temperature operation:	T_A = 85°C			---	---	---	---
50.9	Collector cutoff current	V_{CE} = 15 Vdc V_{EB} = 0			I_{CES}	---	100	uAdc
50.40	Static forward current transfer ratio	V_{CE} = 5 Vdc I_C = 40 mAdc			h_{FE}	---	80	---
30.7	Low temperature operation:	T_A = -55°C			---	---	---	---
50.40	Static forward current transfer ratio	V_{CE} = 5 Vdc I_C = 40 mAdc			h_{FE}	7.5	---	---
40.8	Salt atmosphere (corrosion)	3/			---	---	---	---
	Subgroup 6							
40.15	Tension test	Tension force:2 lb.	4.0	L6 Reduced:L4 Procedure:R-1	---	---	---	---
40.17	Torque	Torque:8 lb-in			---	---	---	---

TABLE II. Group B Inspection (cont'd)

MIL-S-19500 Appx. C Ref. Par.	Examination or Test (see 4.3)	Conditions (see 4.1)	AQL (percent defective)	Inspection Level or Code	Symbol	Limits Min.	Limits Max.	Unit
	Subgroup 7							
30.11	Thermal resistance		4.0	L6 Reduced:L4 Procedure:R-1	θ_{j-c}	---	0.075	°C/mW
	Subgroup 8							
40.7	Storage life	Method B T_{stg}=+100 °Cmin	λ=10		---	---	---	---
	Subgroup 9							
40.7	Operation life	Method B V_{CB} = 25 Vdc I_C = 40 mAdc T_C = +25°C	λ=10		---	---	---	---
	End point tests for Subgroups 2, 3, 5, 6, 8 and 9:							
50.9	Collector cutoff current	V_{CE} = 15 Vdc V_{EB} = 0			I_{CES}	---	4.0	uAdc
50.9	Collector cutoff current	V_{CE} = 35 Vdc V_{EB} = 0			I_{CES}	---	200	uAdc
50.6	Emitter cutoff current	V_{EB} = 1 Vdc I_C = 0			I_{EBO}	---	200	uAdc
50.40	Static forward current transfer ratio	V_{CE} = 5 Vdc I_C = 40 mAdc			h_{FE}	13	70	---

1/ Per Method 102A in Standard MIL-STD-202.
2/ Rejects from electrical-test samples may be used for this test.
3/ Marking shall have remained legible at conclusion of this test.

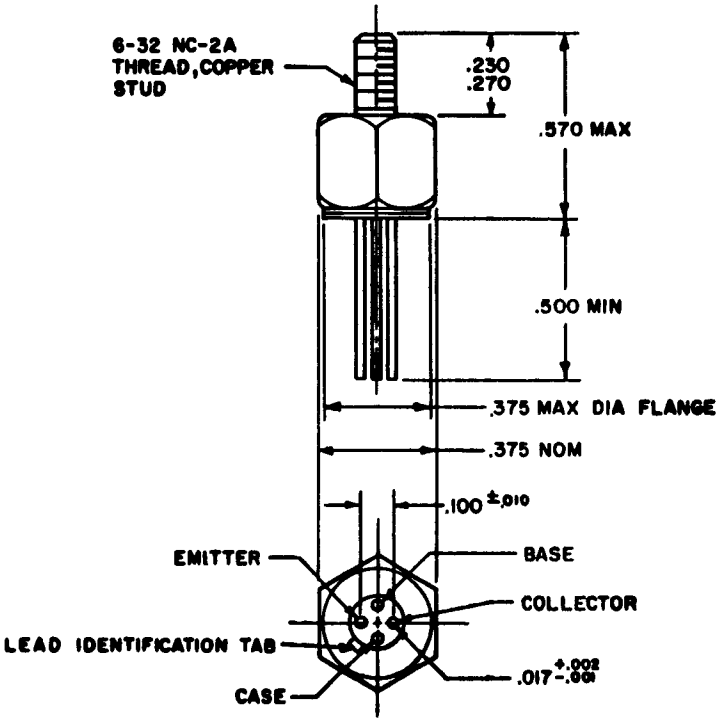
5 PREPARATION FOR DELIVERY

5.1 Preparation for delivery.- Preparation for delivery shall be in accordance with Specification MIL-S-19500.

6 NOTES

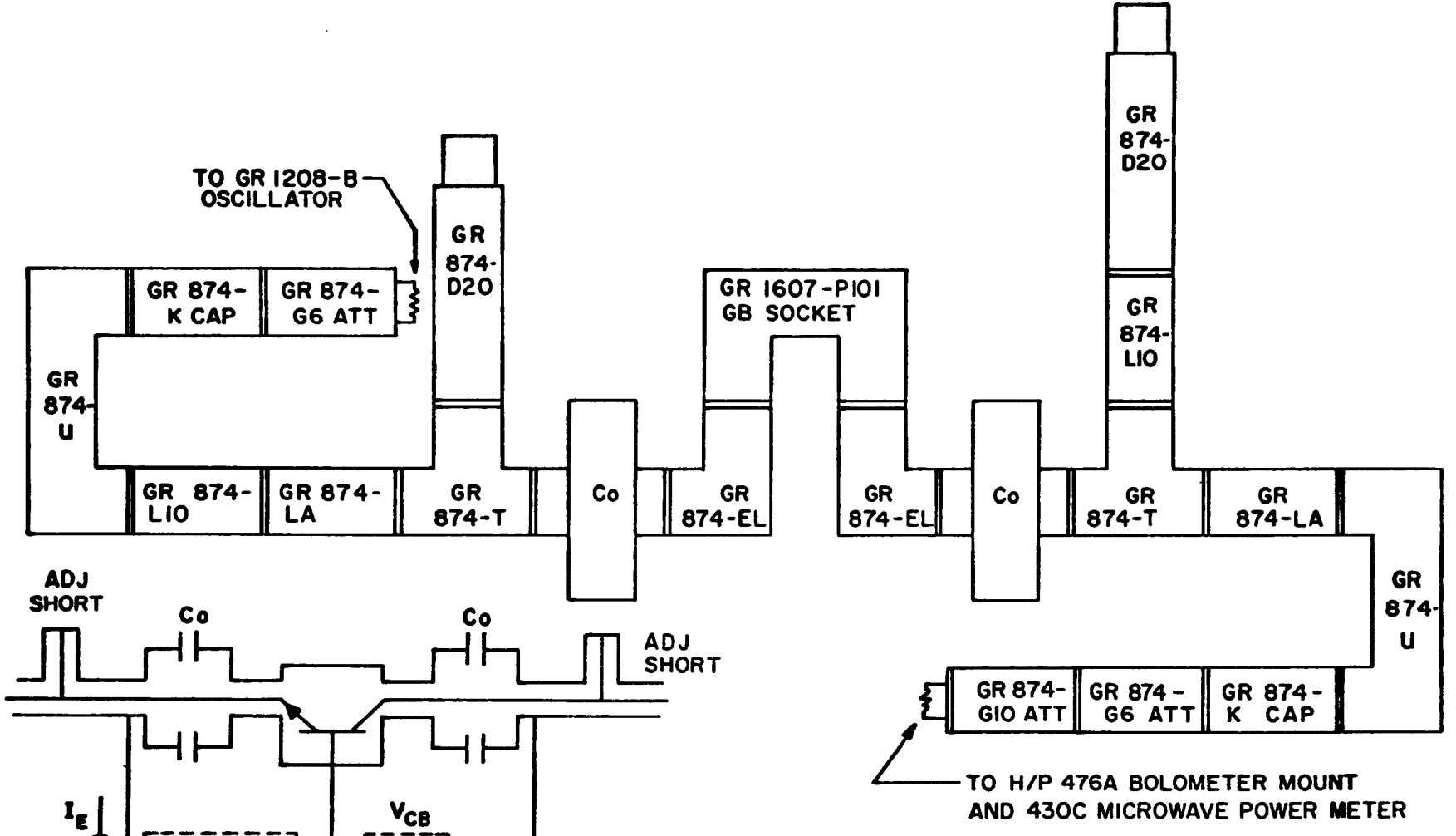
6.1 Notes.- The notes included in Specification MIL-S-19500, except for those concerning Qualification, are applicable to this specification. (See 4.2 herein.)

NOTICE: When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

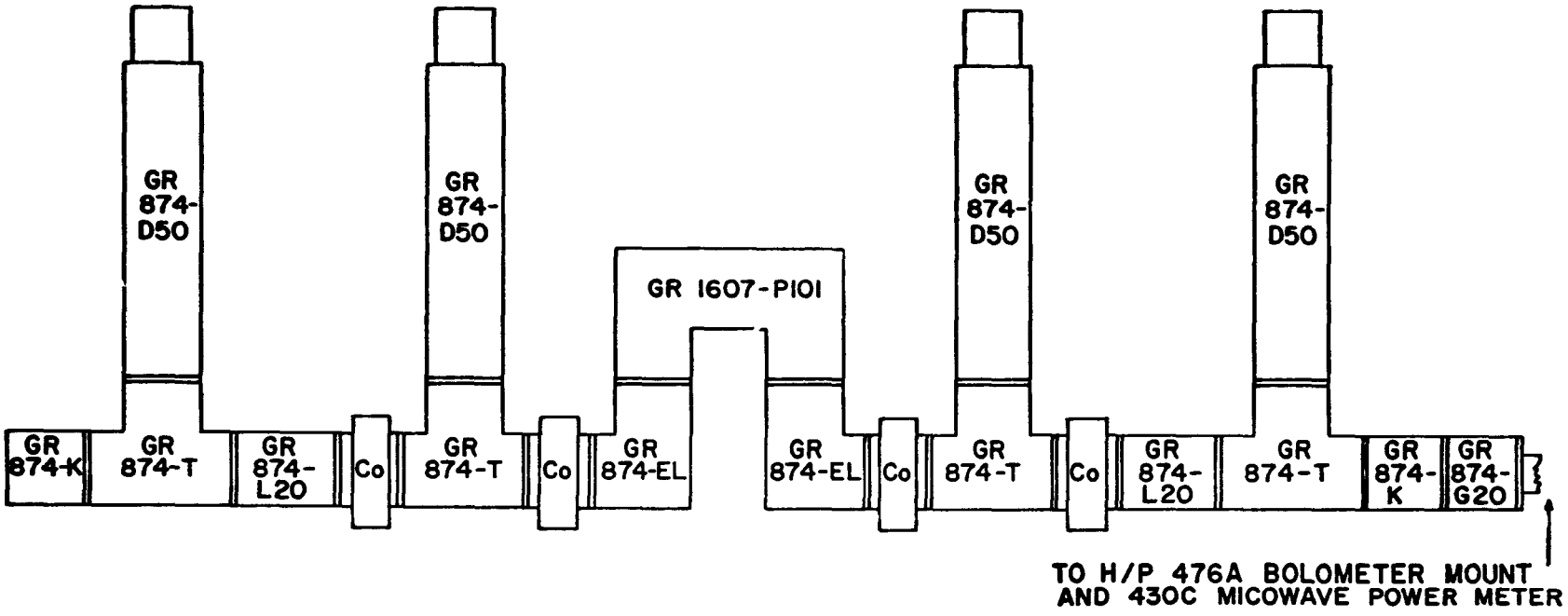


OUTLINE DRAWING

FIGURE 1

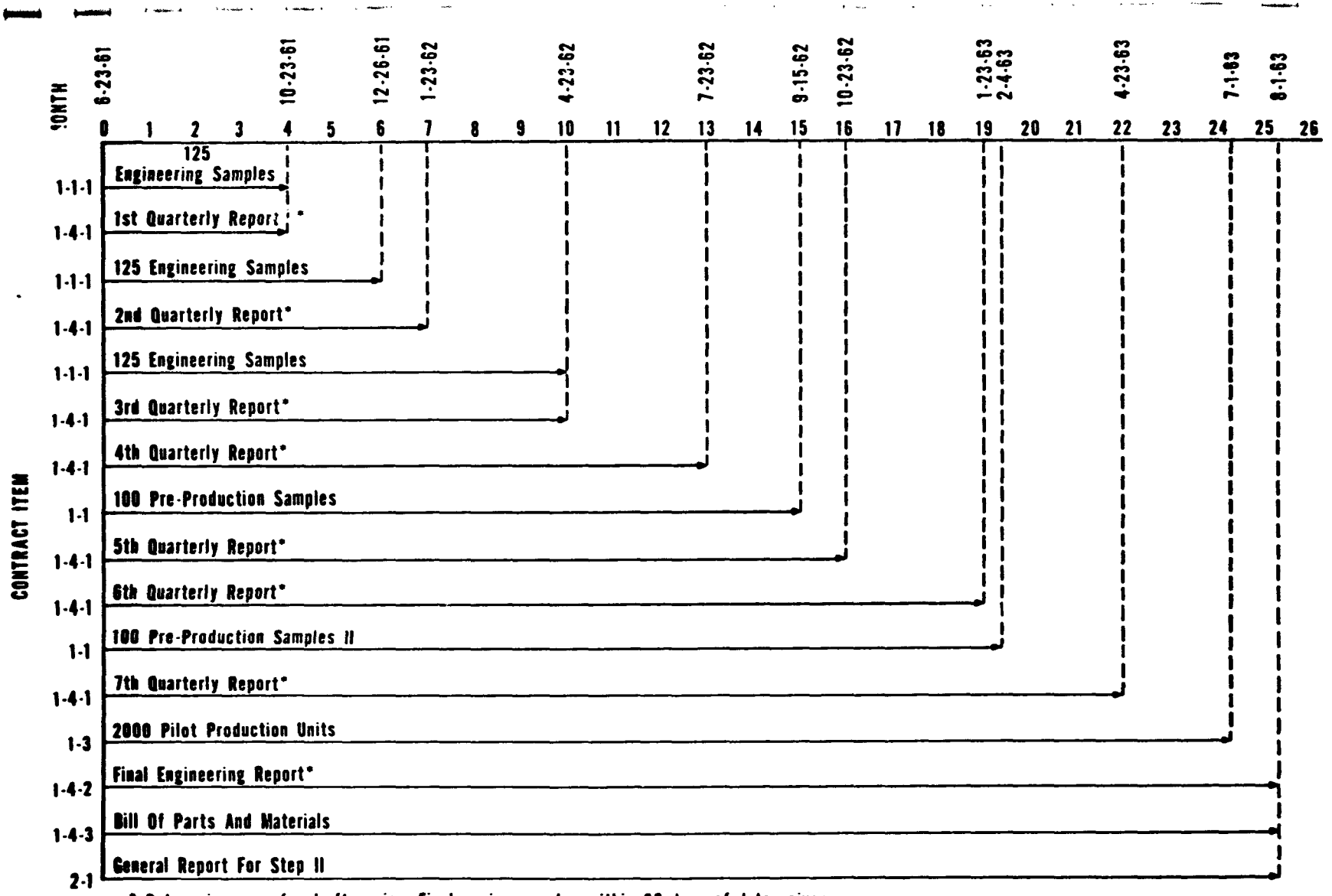


400 Mc TUNED
LINE AMPLIFIER



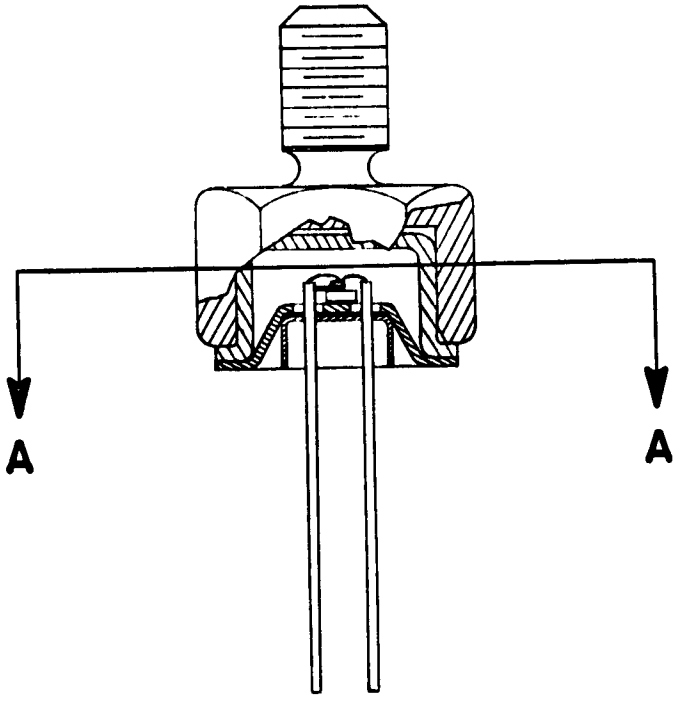
400 MC TUNED
LINE OSCILLATOR

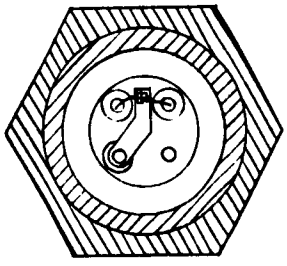
FIGURE 3



* Dates given are for draft copies. Final copies are due within 30 days of dates given.

FIGURE 4 - CONTRACT SCHEDULE

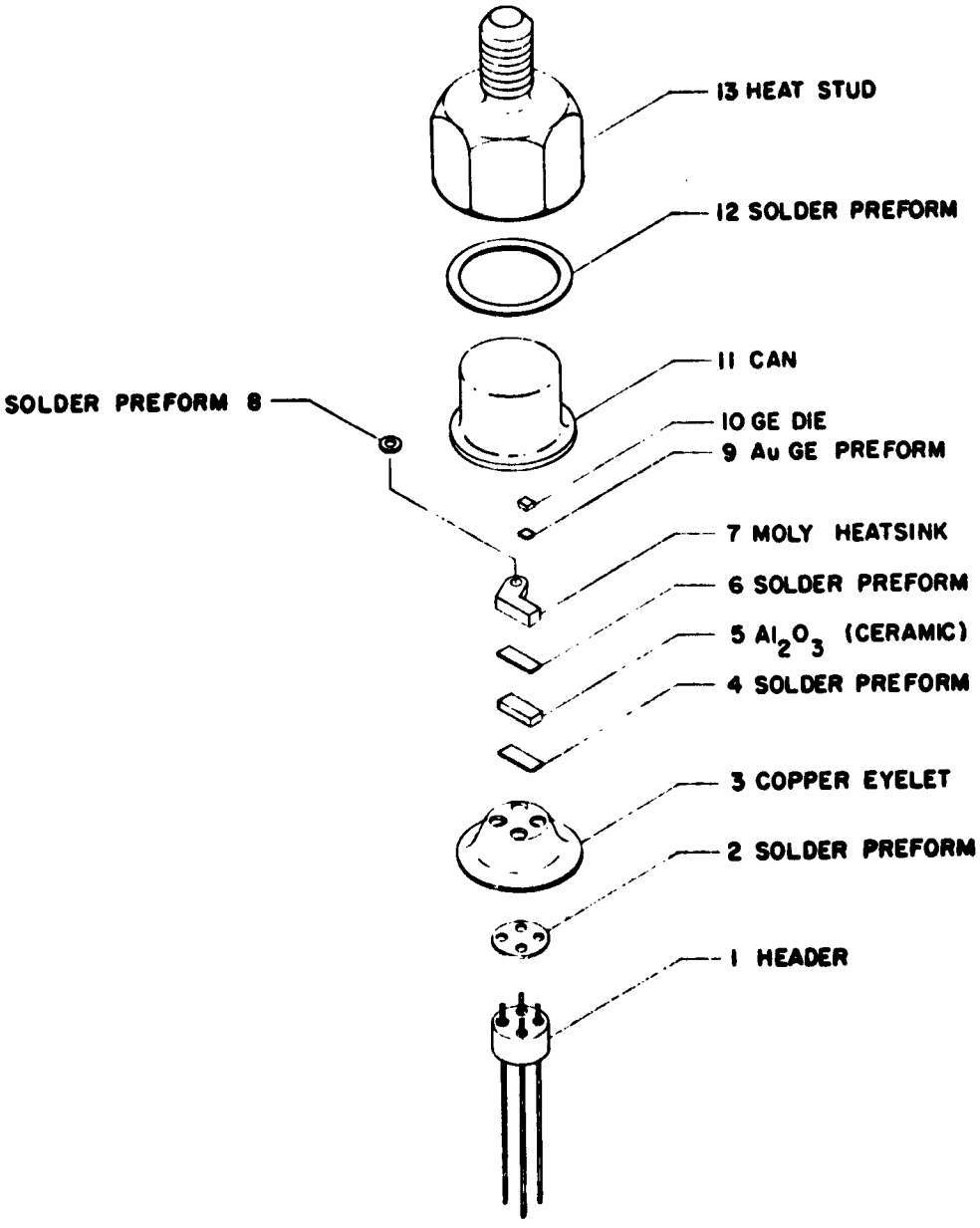




SECTION AA

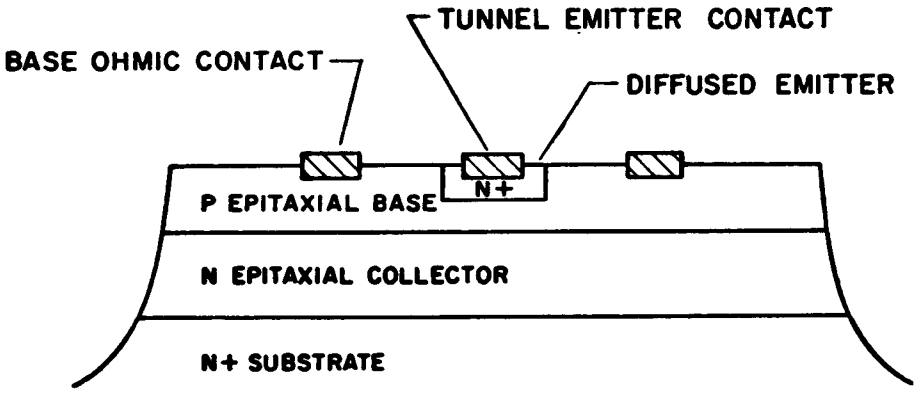
DEVICE SECTIONAL DRAWING

FIGURE 5



DEVICE EXPLODED VIEW

FIGURE 6



CROSS SECTION OF DEVICE STRUCTURE

FIGURE 7

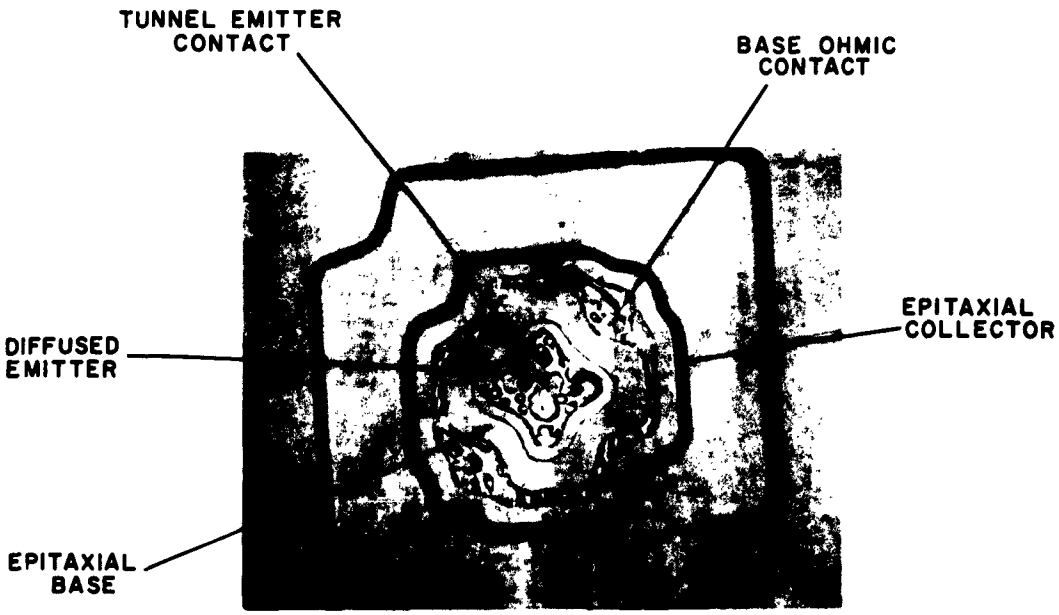


FIGURE 8

NOTE: THE LINE DEFINING THE DIFFUSED EMITTER HAS BEEN DRAWN ON THIS PHOTOGRAPH FOR ILLUSTRATIVE PURPOSES ONLY.

MOTOROLA
Semiconductor
Products Inc.
A SUBSIDIARY OF MOTOROLA INC
3005 EAST McDOWELL ROAD PHOENIX, ARIZONA

FIGURE 9 - 1

GROUP B POST TEST DATA
SUB GROUP 2

DEVICE 2N2568 LOT NO. PRE-PRODUCTION SAMPLES II

	I_{CES}	I_{CES}	I_{EBO}	h_{FE}
	V_{CE} = 35V V_{EB} = 0	V_{CE} = 15V V_{EB} = 0	V_{EB} = 1.0 V I_C = 0	V_{CE} = 5V I_C = 40mA
UNIT	μAdc	μAdc	μAdc	—
MIN	—	—	—	13
MAX	200	4.0	200	70
01	.20	.10	16.5	22.5
02	.30	.12	11.5	36.4
03	.18	.11	27.0	18.6
04	.25	.10	8.0	41.7
05	.32	.18	22.0	27.8
06	1.5	.35	—	—
07	.54	.17	8.5	40.0
08	.42	.11	8.4	35.7
09	.26	.11	15.5	34.5
10	7.0	.16	46.0	37.0
11	.90	.34	.06	38.4
12	.74	.28	.10	27.4
13	.78	.33	.07	40.0
14	.74	.25	.08	40.0
15	.80	.26	.16	36.3
16	.44	.14	.10	30.8
17	.63	.26	.20	41.7
18	.46	.17	.16	47.6
19	.44	.21	17.5	23.5
20	.75	.30	.12	40.0
21	.62	.23	.56	45.5
22	.76	.16	.10	27.4
23	.42	.18	.13	45.7
24	1.05	.31	.10	25.0
25	1.35	.58	.87	44.5
DATE				
INIT				

REMARKS

NAME _____ TITLE _____ DATE _____

MOTOROLA Semiconductor Products Inc.
A SUBSIDIARY OF MOTOROLA INC
5005 EAST McDOWELL ROAD PHOENIX, ARIZONA

FIGURE 9-2

GROUP B POST TEST DATA
SUBGROUP 2

PRE-PRODUCTION

DEVICE 2N2568 LOT NO. SAMPLES II

	I_{CES} $V_{CE}=35V$ $V_{EB}=0$	I_{CES} $V_{CE}=15V$ $V_{EB}=0$	I_{EBO} $V_{EB}=1.0V$ $I_C=0$	h_{FE} $V_{CE}=5V$ $I_C=40mA$
UNIT	μAdc	μAdc	μAdc	—
MIN	—	—	—	13
MAX	200	4.0	200	70
26	.78	.37	.70	31.8
27	4.4	.27	.11	31.2
28	1.55	.67	.60	54.8
29	.60	.23	.12	34.5
30	.48	.24	11.0	22.2
31	.84	.32	.11	41.7
32	.52	.19	.10	28.2
33	1.85	.84	1.05	60.6
34	5.2	.06	18.6	31.2
35	1.5	.61	.57	48.8
36	.56	.21	.12	21.2
37	4.8	.18	.18	46.0
38	.51	.38	1.1	34.5
39	1.8	1.1	.60	44.5
40	.46	.14	2.05	30.5
41	.34	.10	.80	22.3
42	.58	.22	2.35	27.8
43	.60	.11	.74	32.8
44	.26	.16	1.0	32.2
45	.50	.12	8.0	27.8
46	.40	.23	1.85	30.7
47	.68	.24	1.95	23.5
48	.42	.17	1.5	36.7
49	.71	.13	1.15	31.2
50	.26	.11	1.4	32.3
DATE				
INIT				

REMARKS

NAME _____ TITLE _____ DATE _____

FIGURE 10-1

MOTOROLA Semiconductor Products Inc.
A SUBSIDIARY OF MOTOROLA INC
5005 EAST McDOWELL ROAD PHOENIX, ARIZONA

GROUP B
HIGH AND LOW TEMPERATURE TEST DATA

DEVICE 2N2568 LOT NO. PRE-PRODUCTIC SAMPLES II

	I_{CES} V_{CE} = 15V V_{EB} = 0 T_A = 85°C					h_{FE} V_{CE} = 5V I_C = 40mA T_A = 85°C					h_{FE} V_{CE} = 5V I_C = 40mA T_A = -55°C				
UNIT	μAdc					—					—				
MIN	—					—					7.5				
MAX	100					80					—				
51	4.1					35.7					22.2				
52	7.0					61.6					33.3				
53	6.1					36.4					21.0				
54	21.5					66.7					35.7				
55	5.0					34.5					20.0				
56	4.7					33.3					20.0				
57	6.2					47.7					24.4				
58	7.3					24.5					21.3				
59	7.4					25.5					17.7				
60	7.0					45.5					27.0				
61	6.0					26.3					15.4				
62	4.4					50.0					29.4				
63	4.2					43.5					26.3				
64	4.7					40.0					22.8				
65	5.5					37.0					22.3				
66	6.7					22.2					13.3				
67	4.1					21.0					13.2				
68	4.6					35.7					21.0				
69	3.2					20.8					13.3				
70	6.2					35.8					22.2				
71	6.2					33.3					17.4				
72	9.8					36.4					22.7				
73	6.8					31.7					21.3				
74	6.2					25.6					15.3				
75	5.9					29.4					17.8				
DATE															
INIT															

REMARKS

NAME _____ TITLE _____ DATE _____

FIGURE 10-2

MOTOROLA Semiconductor Products Inc.
A SUBSIDIARY OF MOTOROLA INC
5005 EAST McDOWELL ROAD PHOENIX, ARIZONA

GROUP B
HIGH AND LOW TEMPERATURE TEST DATA

PRE-PRODUCTION
DEVICE 2N2568 LOT NO. SAMPLES II

	I_{CES} V_{CE} = 15V V_{EB} = 0 T_A = 85°C					h_{FE} V_{CE} = 5V I_C = 40mA T_A = 85°C					h_{FE} V_{CE} = 5V I_C = 40mA T_A = -55°C				
UNIT	μAdc					—					—				
MIN	—					—					7.5				
MAX	100					80					—				
76	6.1					38.4					23.5				
77	7.2					30.8					18.6				
78	6.0					39.2					23.8				
79	6.2					40.0					23.5				
80	6.7					36.7					23.2				
81	5.9					40.0					23.5				
82	8.0					28.5					17.4				
83	8.1					34.4					21.0				
84	12.0					34.5					21.1				
85	7.5					35.4					20.0				
86	6.7					28.6					17.7				
87	5.1					36.4					22.2				
88	4.5					38.5					22.8				
89	8.2					31.2					19.5				
90	9.5					31.2					18.2				
91	5.4					26.6					17.4				
92	6.1					29.4					17.7				
93	11.0					36.4					22.2				
94	5.8					30.7					18.6				
95	5.4					37.0					23.5				
96	6.8					27.8					16.7				
97	4.6					38.5					23.5				
98	5.7					33.3					21.3				
99	8.3					37.0					22.2				
100	6.2					37.0					22.2				
DATE															
INIT															

REMARKS

NAME _____ TITLE _____ DATE _____

MOTOROLA
Semiconductor Products Inc.
A SUBSIDIARY OF MOTOROLA INC
5005 EAST McDOWELL ROAD PHOENIX, ARIZONA

FIGURE 11-1

GROUP B POST TEST DATA
SUBGROUP 5

DEVICE 2N2568 LOT NO. PRE-PRODUCTION SAMPLES II

	I_{CES} $V_{CE}=35V$ $V_{EB}=0$			I_{CES} $V_{CE}=15V$ $V_{EB}=0$			I_{EBO} $V_{EB}=1.0V$ $I_C=0$					h_{FE} $V_{CE}=5V$ $I_C=40mA$				
UNIT	μAdc			μAdc					μAdc					—		
MIN	—			—					—					13		
MAX	200			4.0					200					70		
51	.36			.16					17.5					30.7		
52	2.25			.60					6.6					50.0		
53	.40			.20					10.5					27.4		
54	2.05			.73					.80					50.0		
55	.40			.15					17.5					27.4		
56	.30			.12					15.5					27.0		
57	1.4			.19					28.5					40.0		
58	.46			.17					4.0					28.6		
59	.90			.16					3.9					24.1		
60	.46			.15					2.3					31.0		
61	.44			.14					.73					21.2		
62	.5			.15					.77					46.0		
63	.30			.12					.65					35.7		
64	.35			.14					.54					31.7		
65	.42			.20					1.25					30.7		
66	.78			.33					20.0					18.1		
67	.38			.17					19.0					17.7		
68	.36			.16					13.0					28.6		
69	.25			.10					25.5					17.4		
70	.62			.18					3.3					27.4		
71	1.50			.30					2.8					22.2		
72	.52			.28					.29					24.4		
73	.54			.17					2.7					27.0		
74	.71			.15					3.1					21.0		
75	1.90			.16					1.2					24.0		
DATE																
INIT																

REMARKS

NAME _____ TITLE _____ DATE _____

MOTOROLA
Semiconductor Products Inc.
A SUBSIDIARY OF MOTOROLA INC
5005 EAST McDOWELL ROAD PHOENIX, ARIZONA

FIGURE 11-2

GROUP B POST TEST DATA
SUBGROUP 5
PRE-PRODUCTION
DEVICE 2N2568 LOT NO. SAMPLES II

	I_{CES}	I_{CES}	I_{EBO}	h_{FE}	
	V_{CE} = 35V V_{EB} = 0	V_{CE} = 15V V_{EB} = 0	V_{EB} = 1.0V I_C = 0	V_{CE} = 5V I_C = 40mA	
UNIT	μAdc	μAdc	μAdc	—	
MIN	—		—	13	
MAX	200	4.0	200	70	
76	1.5	.21	.61	31.7	
77	2.1	.22	9.6	25.6	
78	.44	.14	1.8	31.7	
79	.44	.19	2.1	31.2	
80	.30	.16	.[illegible]	3[illegible].7	
81	.28	.12	.[illegible]	31.7	
82	.78	.28	4.9	32.7	
83	.66	.33	3.4	[illegible]1.6	
84	1.15	.44	3.3	28.4	Ground Lead
85	.40	.20	2.7	2[illegible]	Broken off
86	.50	.19	1.25	24.0	
87	.72	.16	2.9	30.3	
88	.48	.16	1.25	31.2	
89	1.1	.33	7.3	25.6	
90	.97	.31	.57	25.0	
91	.56	.17	8.2	22.2	
92	.72	.16	9.8	25.0	
93	.74	.44	.50	30.7	
94	.90	.15	4.1	25.0	
95	.72	.14	4.4	30.8	
96	.86	.20	2.1	22.2	
97	.57	.12	1.0	31.2	
98	.42	.14	3.5	28.6	
99	.70	.27	2.1	30.8	
100	.48	.18	1.2	30.8	
DATE					
INIT					

REMARKS

NAME _____ TITLE _____ DATE _____

FIGURE 12

PAGE ____ OF ____

MOTOROLA Semiconductor Products Inc.
A SUBSIDIARY OF MOTOROLA INC
5005 EAST McDOWELL ROAD PHOENIX, ARIZONA

VIBRATION
VARIABLE FREQUENCY TEST DATA

DEVICE 2N2568 LOT NO. SPECIAL

		I_{CES} V_{CE} = 15 Vdc V_{EB} = 0					I_{EBO} V_{EB} = 1.0 Vdc I_C = 0					h_{FE} V_{CE} = 5V I_C = 40 mA				
		INITIAL		POST TEST			INITIAL		POST TEST			INITIAL		POST TEST		
	UNIT	uAdc		uAdc			uAdc		uAdc			1		1		
	MIN															
	MAX															
Am-AR SYSTEM	1	.24		.24			2.05		2.4			23.5		23.5		
	2	.27		.26			.24		.27			14.5		15.3		
	3	.44		.44			3.3		3.8			25.0		25.6		
	4	.30		.29			7.5		8.2			22.2		22.7		
	5	.26		.26			1.75		2.1			32.3		33.3		
	6	.28		.27			1.5		1.6			24.1		24.4		
	7	.27		.27			4.0		4.3			21.5		22.2		
	8	.24		.24			2.8		2.9			25.6		25.6		
	9	.27		.27			3.8		4.0			22.7		22.7		
	10	.28		.28			4.6		4.6			25.0		25.0		
ALL AR SYSTEM	11	.60		.86			9.4		10.0			17.8		18.2		
	12	.26		.22			11.0		11.5			16.6		16.6		
	13	.36		.38			14.0		15.0			17.7		17.7		
	14	.37		.37			9.2		9.8			17.7		17.7		
	15	.32		.32			8.7		9.2			21.2		21.5		
	16	1.10		1.10			7.6		8.0			14.5		14.5		
	17	.28		.29			8.6		9.0			22.2		22.2		
	18	.26		.26			9.0		9.6			21.0		20.4		
	19	.33		.35			9.1		8.5			16.6		16.6		
	20	.23		.23			8.4		8.8			22.7		23.2		
	DATE															
	INIT															

REMARKS

NAME _____ TITLE _____ DATE _____

MQC-2

MOTOROLA
Semiconductor Products Inc.
A SUBSIDIARY OF MOTOROLA INC
8008 EAST McDOWELL ROAD PHOENIX, ARIZONA

FIGURE 13
CONSTANT ACCELERATION TEST DATA

PAGE ____ OF ____

DEVICE 2N2568 LOT NO. SPECIAL

	I_{CES} V_{CE} = 15 Vdc V_{EB} = 0					I_{EBO} V_{EB} = 1.0 vdc I_C = 0					h_{FE} V_{CE} = 5V I_C = 40 mA				
	INITIAL		POST TEST			INITIAL		POST TEST			INITIAL		POST TEST		
UNIT	μAdc		μAdc			μAdc		μAdc			—		—		
MIN															
MAX															
1	.51		.48			14.5		15.5			12.3		12.3		
2	.29		.26			16.0		17.0			33.3		33.3		
3	.30		.27			8.6		9.3			55.6		57.2		
4	.26		.25			12.5		14.0			26.3		26.6		
5	.38		.36			11.0		12.0			34.5		34.5		
6	.96		.92			8.1		8.6			29.4		29.4		
7	.26		.24			1.25		1.35			12.3		12.3		
8	.57		.57			3.8		4.0			10.7		10.3		
9	.25		.22			1.25		1.30			19.0		19.0		
10	2.0		1.85			10.0		10.5			11.7		12.4		
11	.38		.38			5.9		6.4			14.5		14.5		
12	.32		.33			9.0		8.7			12.3		12.3		
13	.30		.30			7.4		8.0			10.7		10.7		
14	1.50		2.05			9.0		9.7			11.4		11.9		
15	.42		.43			8.6		9.4			9.4		9.4		
16	.33		.33			11.5		12.5			15.1		15.4		
17	.45		.44			12.5		13.5			15.4		15.4		
18	.30		.30			11.5		18.0			15.4		15.7		
DATE															
INIT															

Am-AQ SYSTEM

ALL AQ SYSTEM

REMARKS

NAME _____ TITLE _____ DATE _____

MQC-284

FIGURE 14

PAGE ____ OF ____

MOTOROLA Semiconductor Products Inc.
A SUBSIDIARY OF MOTOROLA INC
5005 EAST McDOWELL ROAD PHOENIX, ARIZONA

SHOCK TEST DATA

DEVICE 2N2568 LOT NO. SPECIAL

ALL AL SYSTEM | Au-Al SYSTEM

	I_{CES} V_{CE} = 15 Vdc V_{EB} = 0					I_{EBO} V_{EB} = 1.0 Vdc I_C = 0					h_{FE} V_{CE} = 5V I_C = 40 mA				
	INITIAL		POST TEST			INITIAL		POST TEST			INITIAL		POST TEST		
UNIT	μadc		μadc			μadc		μadc			—		—		
MIN															
MAX															
1	.74		.68			1.35		1.6			19.0		16.6		
2	.49		.35			1.30		1.55			17.8		19.0		
3	.36		.32			1.0		1.2			16.0		15.4		
4	.24		.22			1.15		1.4			17.8		17.8		
5	.26		.24			1.2		1.45			13.8		12.3		
6	.26		.24			11.0		13.0			12.7		12.9		
7	.38		.34			11.0		1.3			9.8		10.0		
8	.25		.19			12.5		1.5			13.1		12.9		
9	1.30		1.40			13.5		1.6			15.0		15.4		
10	.45		.37			10.0		1.15			6.45		6.56		
GATE															
INIT															

REMARKS

NAME _____ TITLE _____ DATE _____

MOC-2